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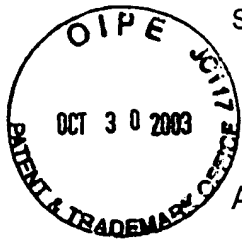
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Kirkland W. Vogt
Serial Number: 09 / 818,246
Filed: March 27, 2001
For: AN ACRYLIC ELASTOMER COMPOSITION, A
TEXTILE-ELASTOMER COMPOSITE MADE
THEREWITH, AND METHOD OF MAKING SAME
Group Art Unit: 1771
Examiner: Cole, Elizabeth M.

**DECLARATION OF THE INVENTOR
KIRKLAND W. VOGT**

1. My name is Kirkland W. Vogt, and I am the inventor in the above-captioned patent application. I currently work as a Senior Research Engineer for Milliken & Company in Spartanburg, South Carolina. I have personal knowledge of the facts in this Declaration. The pages attached to this Declaration are copies of actual pages taken from my personal laboratory notebook.
2. My educational background is as follows: I received a PhD in Chemical Engineering from Georgia Institute of Technology (Georgia Tech) in 1994. Furthermore, I received a B.S. in Paper Science and Engineering from the University of Wisconsin-Stevens Point in 1988.
3. I am experienced in the manufacture of textile materials, including textile finishing and the like.
4. I have reviewed the Office Action recently received from the U.S. Patent and Trademark Office dated March 14, 2003.

5. The primary cited reference, U.S. Patent No. 6,040,393 to Vogt et al (the "Vogt patent") is a patent which issued based upon work I performed in 1998 and early 1999. I have detailed and thorough knowledge of the information contained in this primary reference.

6. In April/May 1998, I was working on the problem of how to formulate an elastomer composite that could be successfully and commercially used in forming a material that could be used as a simulated leather, or a "leather-like" synthetic material.

7. My earliest attempts, after a significant inventive effort, resulted in the inventions relating to the use of polyurethane in a fabric/elastomer composite by providing a water-borne polyurethane, and then mixing the polyurethane with a heat activated acid-generating chemical, in an aqueous (non-solvent) environment. Once acid is generated, I discovered that the polyurethane would adequately and properly disperse, coagulating in the aqueous system. An elastomeric coating then may be provided upon a textile fabric.

8. Due to cost considerations, I later attempted to find a lower cost solution to the formation of such a product. For such a product to be commercially valuable, it was important that it be capable of manufacture using starting materials which had a lower base cost.

9. Later, on about April 16, 1998 (see attached lab notebook page 10547-36) I attempted to make a fabric/elastomer composite using acrylic, instead of polyurethane. Thus, an acrylic material was substituted for the polyurethane which already had been found to work well. Acrylics of this type were known to cost less than polyurethanes.

10. I chose two commercially available acrylics and ordered them for my use in experiments to find an acceptable lower cost solution. The acrylics I chose at

that time, with knowledge of the prior Vogt patent and all of my previous work, were as follows:

BF Goodrich Vycar 460X104 PVC Emulsion, and
Rhoplex TR407 Acrylic

11. My attempt to use the above mentioned acrylics failed. That is, numerous samples were run in my laboratory (see page 10547-36), but the solution failed to coagulate. When I tried to coagulate the (1) Rhoplex acrylic, and (2) the Vycar acrylic, both of these acrylics failed to coagulate upon contact with acetic acid. According to my lab notebook entry of that day, *"Even liberal amounts[of acid] would not destabilize the emulsions."* See lab notebook page 10547-37. Thus, my attempt to simply substitute an acrylic for a polyurethane did not work.

12. During this time period, on about April 16, 1998 I began to work on the issue of how to make an acrylic work in such a chemical system. I investigated acrylic chemistry, and reviewed the problem, looking for a solution to this problem. The solution was not at first apparent to me, and it required a significant amount of thought and chemical experience to find a solution. At first, I was skeptical that an acrylic could be found that would work in this application. In my lab notebook, on April 16, 1998 I wrote *"Things to try", followed by "(1) Temperature....25...30....40....50....degrees C", (2) pH buffer, (3) Before drying/After drying"*. See attached lab notebook pages 10547-38. These remarks referenced my thought processes as I tried to find a solution to this problem. The solution was not immediately apparent to me. I employed my chemical training to work on this problem.

13. I began to realize that the reason the above mentioned acrylics did not coagulate properly in forming an anionically stabilized acrylic latex which was destabilized under acidic conditions must have something to do with the specific

chemical formulation of the various acrylics that could be employed or used. It then became apparent to me that upon contact with acid, some acrylics (like those I had used, which did not work) would not become destabilized, but instead would undesirably remain in an emulsified state, which would not achieve a textile elastomer composite product. I formulated the hypothesis that other acrylics might be located which under the right conditions, could destabilize from an emulsified state to a non-emulsified state.

14. I began a search for an acrylic material that could achieve a destabilized state upon contact with an acidic material, which therefore could achieve a textile elastomer product. I made telephone inquiries with acrylic suppliers, and inquired regarding the formulations that were available in the marketplace at that time.

15. On about April 21, 1998 I conducted another experiment, using a different acrylic. The acrylic used this time was a Parachem AC-790 Acrylic, made by the Parachem Chemical Company of Simpsonville, South Carolina. I chose this acrylic after thinking about the problem, and making inquiries regarding the exact chemical nature and exact chemical formulation of this particular acrylic. Of the hundreds of acrylics on the market, I chose this particular acrylic because of the properties which I believed it retained that could make it work in this system, including the properties of its emulsification in the presence of acid.

16. I ran about 10-12 samples using the Parachem AC-790 Acrylic. Unexpectedly, I found that this acrylic did not fail, but instead, it worked! This was a surprising and unexpected result, and one which I had hoped for when I chose this particular acrylic product. As indicated in my laboratory notebook entry of April 21, 1998, data was collected showing that at least about seven (7) samples employing this AC-790 product did coagulate properly. See lab notebook page 10547-41.

17. I wrote in my lab notebook, regarding the Parachem AC-790 Acrylic, the following: *"It seems that coagulation [of this product] is slightly softer"*, which indicated that this particular acrylic, due to its specific formulation characteristics, unexpectedly and surprisingly worked well in this chemical system. Thus, I was able to locate a waterborne, anionically-stabilized acrylic latex which would in fact desirably become de-stabilized under acidic conditions. This acrylic latex unexpectedly was found to be capable of being adapted for assuming a non-emulsified state upon contact with acid, resulting in a textile elastomer composite made with an acrylic, rather than a polyurethane.

18. I conducted later work in which I found that the Hystretch V-60 (BF Goodrich) and the Hystretch V-29 (BF Goodrich) were found to work as well. These two were used as Examples 1 and 2 of the patent, as they produced a product which was somewhat softer and more leatherlike than the above mentioned Parachem AC-790. Although all 3 of these respective acrylics would work, the best mode of which I was aware of practicing the invention as of the date the present patent application was filed is accurately reflected in Examples 1-2 of the present patent application, which employ the Hystretch products mentioned above.

19. I have reviewed the reference cited in the Office Action, U.S. Patent No. 4,866,702 (Spek). Spek is directed to impregnating a textile cloth using a blowing agent. This process, in my view, produces a relatively stiff product which is not in any manner equivalent to the invention. A freon blowing agent is employed in Spek. The coagulation process of Spek requires acid or salt compounds, which have the tendency to undesirably coagulate the latex prior to contact with the textile substrate, resulting in a non-uniform dispersion on the substrate surface.

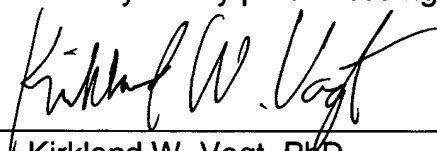
20. The Spek patent mentions at column 5, lines 10-16 a list of polymer latexes, including polyacrylate latex. However, the teaching of Spek also

stresses that polyurethane is preferred, because of the "specific polymer characteristics" of the polyurethane polymer. See column 5, lines 18-20. Spek gives a long list of latexes of various types, at column 5, lines 9-16. No express teaching of exactly which acrylics could be used, or how they would behave in acidic conditions is disclosed. Nothing is said in Spek regarding emulsification of acrylics.

21. In my review of the Spek patent, I do not see any stated or expressed motivation for substitution of an acrylic for the polyurethane of the previously mentioned Vogt patent.

22. Spek does not teach or disclose the invention of this application. Spek does not reveal or specify a textile elastomer composite in which a waterborne, anionically-stabilized acrylic latex is employed, in which the acrylic latex is capable of being destabilized under acidic conditions, or in which the acrylic latex is adapted for assuming a non-emulsified state upon contact with acid.

23. This declaration is made with the knowledge that any willful false statements and the like are punishable by fine or imprisonment, or both, (18 U.S.C. 1001) and may jeopardize the validity of any patent issuing herein.



Kirkland W. Vogt, PhD

Expt 318

Molded cups for BatickChemicals

① BF Goodrich Vycar 460X104 PVC Emulsion

latent reactivity allows mold ability $T_g = 47^\circ\text{C}$

② Rhoplex TR407 Acrylic $T_g = 34^\circ\text{C}$
 * low formaldehyde version of Rhoplex TR-407
 Use here for molded bins
 Spray Add-on 30% of final goods
 for adhesion (40% out)

	Chemical	Feed pressure	Dry Pickup	Chem.	Dry Pickup
A①	100% Vycar	0 psi	194%	K①	20% Rhoplex 13%
A②	100% Rhoplex	0 psi	113%	K②	20% Vycar 13%
B①	100% Vycar	40 psi	~80%?	K③	15% Rhoplex 9%
B②	100% Rhoplex	40 psi	63%	K④	15% Vycar 10%
C①	75% Rhoplex	40 psi	47%	L①	65% Rhoplex ~40%
C②	75% Vycar	40 psi	55%	L②	65% Vycar 45%
D①	50% Rhoplex		31%		
D②	50% Vycar		34%		
E①	25% Rhoplex		16%		
E②	25% Vycar		17%		
F①	10% Rhoplex		7%		
F②	10% Vycar		6%		
G①	5% Rhoplex		4%		
G②	5% Vycar		3%		
H①	Control 0%		0%		
H②	Control 0%		0%		
I①	35% Rhoplex		21%		
I②	35% Vycar		23%		

Molded in
 Willbanks bin
 molder at
 380°F for
 5-10 secs

Signature

Witness

Kubler W. Vogt

G. J. B. Carter

16, 1998
 5 Mar 1999

Expt 318 cont

B) Tried to coagulate Rhoplex + Vycar with conc. Acetic acid. Even liberal amounts would not destabilize emulsions. I ordered a sample of a acid-unstable acrylic latex (like Rhoplex) from Parachem.

Results: Shape retention
After 1 wash

Vycar: 34-80% ; 45-55% best. ~~with~~

Rhoplex: 40-113% ; 63% best

Date

April 16, 1998

Date

5 May 1998

Signature

Kimberly W. Vest

Witness

Elizabeth Cates

Results of Ept 3/7

Moisture Transport

Lipase-treated?

Moisture Transport		
<u>0</u>	<u>1W</u>	<u>5W</u>
<1.0	36.6	83.4

Soil Release		4/5	
<u>Oil</u>	<u>BMO</u>	<u>Co</u>	<u>BMO</u>
<u>2.8</u>	<u>1.0</u>	<u>3.5</u>	<u>1.0</u>

→ Poor

VISA-Treated 2.5% DA-45

Moisture Transport		
<u>0</u>	<u>1W</u>	<u>5W</u>
<1.0	<1.0	<1.0

Soil Release		4/5	
<u>Oil</u>	<u>BMO</u>	<u>Co</u>	<u>BMO</u>
<u>5.0</u>	<u>5.0</u>	<u>5.0</u>	<u>5.0</u>

Things to try

① Temperature 25°C ✓
 30°C
 40°C
 50°C
 ⋮

② pH Buffer

③ Before Dyeing
 After Dyeing

Date April 16, 1998
 Date 5 May 1998

Signature Kirk W. Vogt
 Witness Elizabeth Cates

Expt 319

Add Themasorb Microcapsules to
Coagulated Polyurethane.

Firshy (Sales Co.) recommends @ least
8-12 g/ft² concentration.

Use style 3368: 24.2 g/ft²

A) Find mixture	g Witcoland W-293	g Themasorb	Mixable?
1:0.5	20g	10g	Yes
1:1	20g	20g	Very thick
3:2 (1:0.67)	30g	20g	thick - ok

B) Make mixes put on S/3368	g TS/g Fabric
1) <u>Fabric start</u> <u>end</u> <u>Pickup</u> <u>Mix</u>	<u>g TS/g Fabric</u>
15.48g 20.90g 35% 1:0.67	17.5g TS/100g
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $\Rightarrow 4.2 \text{ g TS/ft}^2$ </div>	
w/ std. coagulation ratio (dil 50/50 w/ water) good hand (30% more)	

2) 15.02	26.02	73.2%	1:0.67	0.366 g TS/g fabric
(60% coag. mix)				

$\Rightarrow 8.9 \text{ g TS/ft}^2$

Poor hand
over-dried

Date

April 21, 1998

Date

5 May 1998

Signature

Guthrie W. Vogt

Witness

Elizabeth Carter

Expt 319 Cont:

3) Start end pickup mix g TS/g fabric
 14.83 29.24 97% 1:1
 knife coat 0.63 g/g
 poor

$\Rightarrow 15 \text{ g/ft}^2$

60% formula
Coag

4) Start end pickup mix g TS/g fabric
 14.95 30.77 106-115% 1:0.67
 over ~ 85% knife coat ~ 0.55 g/g
 fabric ok 0.6

$\Rightarrow \textcircled{12.0} - 15 \text{ g/ft}^2$

60% Coag
Formula

Submitted to textile testing for heat analysis

5) Control 50% solids coagulation formula - 20psi = 100% pickup
 start: 15.62 final 22.59 45% over
 end: ~~16.02~~

6) Control 17% solids coagulation formula
 start: 16.02 final 18.23 14% over

7) Control 8/3368

April 21, 1998
 5 May 1998

Signature

Witness

Walter W. Venz
 Elizabeth Carter

Expt 320 Batick

Coagulation of Parachen AC-790 acrylic
on cup of Bras.

Beaker test for coagulation

A)	Water	Ac-790	HF	Catalix	Steam
A)	—	10g	0.25g	—	Steam 5 min No coag Not mixed well
B)	2g	10g	0.25g	0.25g	10 min Steam
C)	↓	↓	2.5g	2.5g	Coag
D)	↓	↓	0.5g	0.5g	Coag
E)	↓	↓	2.5g	0g	Not in complete coag
F)	↓	↓	0g	2.5g	Coag
G)	2g	↓	0.1g	0.1g	Coag
H)	0g	↓	0.5g	0.5g	Coag
I)	2g	↓	0g	0.1g	No coag.
J)	↓	↓	0.1g	0g	No coag
K)	↓	↓	0.05g	0.05g	partial (80%) coag
L)	2g	10g	0.03g	0.03g	No coag

Note: (D) and (H) has some particulate before steaming

It seems that coagulation with acid is slightly
softer.April 21, 1998
5 May 1998Signature
WitnessKathleen W. Vogt
Elizabeth Cates